

CLAIMS

1. A method for use in a receiver, the method comprising:
processing a received signal with a phase-locked loop (PLL); and
generating a carrier frequency offset estimate as a function of a phase error signal of
5 the PLL.

2. The method of claim 1, wherein the processing step includes the step of setting the
PLL in an open loop mode of operation.

3. The method of claim 2, wherein the generating step includes the steps of:
determining a rollover count value for the phase error signal;
determining a symbol count value of the received signal; and
generating the carrier frequency offset estimate from the determined rollover count
value and determined symbol count value.

4. The method of claim 3, further comprising the step of detecting a false lock
condition as a function of comparing the carrier frequency offset estimate to a closed loop
value of the PLL.

5. The method of claim 1, further comprising the step of updating the PLL with the
carrier frequency offset estimate.

6. A method for use in a receiver, the method comprising:
running a carrier recovery loop in an open loop mode;
generating an estimate of a carrier frequency offset of a received signal from a phase
error signal of the carrier recovery loop;
updating an integrator of the carrier recovery loop with the estimate of the carrier
frequency offset; and
running the carrier recovery loop in a closed loop mode;

7. The method of claim 6, wherein the generating step includes the steps of:
determining a rollover count value for the phase error signal;
determining a symbol count value of the received signal; and

generating the carrier frequency offset estimate from the determined rollover count value and determined symbol count value.

8. A receiver comprising:

- 5 a carrier tracking loop (CTL) for processing a received signal; and
 a processor for estimating a carrier frequency offset as a function of a phase error signal of the CTL.

9. The receiver of claim 8, wherein the processor detects a false lock condition as a
10 function of comparing the estimate of the carrier frequency offset to a closed loop value of the CTL.

10. A receiver comprising:

- a carrier tracking loop (CTL) for processing a received signal; and
15 a processor for (a) setting the CTL in an open loop mode of operation; (b) estimating a carrier frequency offset of the received signal as a function of a phase error signal of the CTL in the open loop mode of operation; (c) updating the CTL with the estimated carrier frequency offset; and (d) setting the CTL in a closed loop mode of operation.

20 11. The receiver of claim 10, wherein the CTL includes a rollover counter and a symbol counter accessible by the processor for use in estimating the carrier frequency offset.

12. The apparatus of claim 10, wherein the receiver is a set-top box.

25 13. An integrated circuit comprising:

- a carrier tracking loop (CTL) for processing a received signal; and
 at least one register for use in setting an operating mode of the CTL, wherein at least one operating mode of the CTL estimates a carrier frequency offset from a phase error signal of the CTL.

30 14. An integrated circuit comprising:
 an input lead for receiving a signal; and
 a carrier tracking loop (CTL) for use in generating an open loop estimate of a carrier frequency offset of the signal from a phase error signal of the CTL.

15. Apparatus comprising:

a complex multiplier for multiplying a receive signal having a carrier frequency with a recovered carrier for providing a derotated signal;

5 a phase error detector responsive to the derotated signal for providing a phase error signal representative of phase errors between the derotated signal and target symbols selected from a predefined symbol constellation;

a loop filter for filtering the phase error signal to provide a filtered signal;

an integrator for integrating the filtered signal to provide an integrated signal;

10 a sin/cos table responsive to the integrated signal for providing the recovered carrier;
and

a processor for updating the integrator with a carrier frequency offset estimate as a function of the phase error signal.

15 16. The apparatus of claim 15, further comprising:

a rollover counter for counting a number of rollovers of the phase error signal; and

a symbol counter for counting a number of symbols in the derotated signal;

wherein the carrier frequency offset estimate is generated from the counted number of rollovers and the counted number of symbols.

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